you know them or not the facts are there and you have set the pupils to discover them. If you will turn them loose among the facts they will be certain to absorb some of them, and in the process will have acquired a habit of attention and a capacity for clear and accurate statement of what they know.

Finally, try to impress each pupil with the fact that each bird is a personality. It is not easy to learn to recognize individual birds, but it can be done, because it has been. No directions can be given here. Each pupil must work it out for himself.

SOME PRACTICAL ELEMENTARY CHEMISTRY.

BY FREDUS N. PETERS,

Central High School, Kansas City, Mo.

In the round table at the Thanksgiving meeting at Chicago of the Chemistry section of the Central Association, a number of very interesting phases of practical chemistry was mentioned by various teachers present. In the course of the discussions the use of hydrochloric acid and sodium bicarbonate, instead of baking powder, for making biscuits was suggested by the writer, and he was asked to give the details of the experiment as carried out by his students.

The subject of baking powders had been discussed in class and the question raised as to what substitutes might be offered for the leavening agents now upon the markets. Would common marble with hydrochloric acid do? If so, why? If not, what objection? Would common soda and hydrochloric acid do? Considering it as to the residue left in the bread, how would it compare with the ordinary baking powders?

It was proposed to the pupils that they make the matter one of practical experiment; to this they readily assented. The trouble came when the proposition was suggested at home, for many of the mothers, and especially the domestics, not understanding the chemistry of the case, felt sure they were to be poisoned by the "acid." As a result much of the work was done by the girls and boys themselves, who, not skilled in cooking, did not have as great success as might have attended other hands, accustomed to doing such things rapidly. It is well known that much delay in the baking after the dough has been made up is fatal to best results with any powder.

The writer prepared a lot of specimen tubes from heavy glass

tubing so there would be no danger of breakage on the way home; also a considerable quantity of hydrochloric acid of such strength that 10 cc. would exactly decompose an ordinary teaspoonful of soda. The specimen tubes were numbered and filled with the acid. The students were furnished with the following detailed instructions:

"Sift one teaspoonful of soda with one quart of flour, as usual, so as to mix them thoroughly; do not add any salt. Work in the shortening in the usual way; add the acid to the water to be used in making up the dough. If milk is used instead of water stir constantly while pouring the acid into the sweet milk. Mix the dough as usual and bake as soon thereafter as possible."

Referring to my note book I find the experiments began Feb. 23 and continued daily for about two weeks. Twenty-four experiments in that time were made by the boys and 42 by the girls. Some of the students repeated the work once or twice. The following copied from the note book kept at the time will give an idea of the results:

No. of tube	Date	By whom	Liquid	Flour	Result	Remarks
9	2-23	Dorman	Water	White	Fine	Not enough salt
1	"	Peters	"	Graham	Good	
3	2-24	Thornton	Milk	White	"	
20	2-26	Russell	"	"	Fine	Fig layer cake
28	2-28	Runnells	"	"	"	Spice cake
34	2-27	English	"	"	Excel.	Sponge cake

These are but a few, yet fair samples, of the entire record. Every morning during the continuance of the experiment, the chemistry department before school was a "clearing house" for the various products from the home kitchens. Biscuits of every description, from those beautifully browned and artistically shaped, to those anaemic in appearance and distorted in form, were shown with, apparently, the same degree of pride. Likewise, muffin cakes, spice cake, sponge and layer cakes as appetizing as one ever needs to wish were brought in for inspection. On the whole the results were good, and when it is remembered, as has been stated, that much of the work was done at home by the students themselves, not accustomed to cooking, the results were excellent. From the viewpoint of the chemistry class room, the experiment was a great success and only a lack of time and engrossment by other work has prevented a repetition.